

**REMARKS**

In response to the Office Action dated December 15, 2010 (hereinafter “the Office Action”), the Applicants respectfully request reconsideration. Claims 1-24 were previously pending in this application. By this amendment, claims 1, 10, 21, and 22 are amended. Claims 23 and 24 are cancelled without prejudice or disclaimer. No claims are added. Support for the new claims can be found throughout the specification including the drawings. No new matter has been added. As a result, claims 1-22 are pending for examination with claims 1 and 10 being independent claims.

**Rejections under 35 U.S.C. § 103**

Claims 1-20 stand rejected under 35 U.S.C. § 103(a) as purportedly being unpatentable over U.S. patent No. 4,894,302 to Hoffman *et al.* (hereinafter “Hoffman”) in view of U.S. patent publication No. 2002/0048706 to Mayes *et al.* (hereinafter “Mayes”) in further view of U.S. patent publication No. 2002/0122985 to Sato *et al.* (hereinafter “Sato”). The cited references and the “Response to Arguments” have been reviewed. The Applicants respectfully traverse the rejections for the reasons set forth below.

**I. Claim 1**

Claim 1 is directed to a rechargeable battery and recites, *inter alia*:

an active material having at least one element selected from the group consisting of 1B Group, 2B Group, 6A Group, 7A Group, and 8 Group of a short-form periodic table; and

a conductive material comprising a mixture of fine graphite powder and fine carbon powder, the fine carbon powder having particle diameters on the order of nanometers;

the ionic conductor comprising an element belonging to 2A Group and/or 3B Group of the short-form periodic table, wherein:

the active material has an average particle diameter as small as 1 nanometer, so that the active material exhibits battery reaction as a result of ions from the ionic conductor interacting with particles in the active material, and wherein constant voltage discharging of the device occurs between 1 and 1.5 volts and the device is rechargeable. (emphases added)

Without acceding to the correctness of the rejection, claim 1 has been amended to advance prosecution of the application. Claim 1 patentably distinguishes over any combination of Hoffman, Mayes and Sato for reasons discussed below. From the “Response to Arguments” in the Office Action (p.8), it is apparent that Applicants’ reasons of the prior Amendment were misunderstood. Accordingly, disputed issues are addressed separately below.

*A. Mayes and Sato are not combinable for a rejection under 35 U.S.C. § 103*

Mayes and Sato, used in combination with Hoffman to reject claim 1, are not properly combinable as a basis for a rejection under 35 U.S.C. § 103. Mayes and Sato are not combinable because their teachings conflict. Mayes teaches large conductive particles and smaller (by up to several orders of magnitude) ion host particles, whereas Sato teaches the opposite.

Mayes describes that a cathode comprises a mixture of ion host particles and conductive particles wherein the mixture has an average particle size “typically on the order of **no less than about 100 microns.**” (paragraph [0024], emphasis added) Mayes further describes that a more preferred size for the ion host particles is “less than about **10 nm.**” (paragraph [0106]) Paragraph 0071 of Mayes, cited in the Office Action, also refers generally to the sizes of the mixed particles as being in the 10 to 100 micron range, but provides no further teachings beyond those in paragraphs 0024 and 0106 as to particle size. Since Mayes teaches that the average size of the mixture of particles is no less than 100 microns, and that the ion host particles are significantly smaller than 100 microns, one would reasonably conclude that the conductive particles are significantly larger than 100 microns, as well as being significantly larger than the size of the ion host particles.

In contrast, Sato teaches a size range of 10 nm to 10 microns for the conductive particles, and that the ion host particles are at least an order of magnitude **larger** (100nm to 100  $\mu$ m) than the conductive particles. (Sato, [0014], [0016], and [0054]) Sato notes that this choice of sizes permits the conductive particles to “adhere[] to the periphery of the active material.” (Sato [0054]) In terms of absolute particle sizes as well as relative particle sizes, Sato’s teachings conflict with Mayes. *In re Grasselli* holds that references with conflicting teachings cannot be combined for a rejection under 35 U.S.C. § 103, even when the combined references contain every element of an invention. (See MPEP 2145 X. D. 2. citing *In re Grasselli*, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983))

Therefore, Sato is not properly combinable with Mayes as a basis for setting forth a rejection of claim 1 under 35 U.S.C. § 103.

*B. Mayes teaches away from Applicants' claim and teaches away from Sato*

The Office Action states that Mayes does not “rise[] to the level of ‘teaching away’ from any further art relevant to the particle size of conductive particles.” The Office Action cites Mayes teaching (paragraph [0071]) that the mixture of particles in a cathode “tend to have a size in the 10 to 100 micron range” as a teaching that would lead one of ordinary skill in the art to Applicants’ claim 1, for example. Applicants respectfully disagree.

As set forth above, Mayes’ teachings of average particle size in the mixture and preferred relative sizes of ion host particles to conductive particles are significantly different from and divergent from Applicants’ invention as claimed in claim 1, by orders of magnitude. Mayes describes conductive particle sizes greater than 100 microns, whereas Applicants’ claim 1 recites conductive particle sizes “on the order of nanometers.” Therefore, the teachings of Mayes are sufficient to rise to a level of teaching away. “A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.” *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994) Accordingly, Mayes teaches away from Sato and from Applicants’ claim 1 that recites “fine carbon powder having particle diameters on the order of nanometers.” For a conductive particle size of 100 nm, this size would be 100 to 1000 times smaller than Mayes’ suggested sizes, and would not reasonably be considered as “tending” to have a size in the 10 to 100 micron size range.

*C. None of Hoffman, Mayes, or Sato discloses constant voltage discharge*

Claim 1 recites, *inter alia*, “constant voltage discharging of the device occurs between 1 and 1.5 volts and the device is rechargeable.” None of Hoffman, Mayes, or Sato discloses at least this limitation.

The Office Action (p. 7) cites Hoffman (col. 8, lines 37-46) as purportedly disclosing constant voltage discharging between 1 and 1.5 volts. The section of Hoffman cited in the Office Action discloses, “Open circuit voltage was 1.2 volts.” The section further discloses, “The operational voltage was 0.37 volt.” One would infer from this disclosure that during discharge

operation, the voltage was 0.37 volt, and when not discharging current, the voltage was measured at some undisclosed point in time as 1.2 volts. Hoffman provides no discharge trace, and there is nothing in the cited section of Hoffman or anywhere else that describes or suggests “constant voltage discharging of the device occurs between 1 and 1.5 volts,” as set forth in claim 1. Therefore, Mayes, Sato, and Hoffman, even if combined (a combination which the Applicants do not concede to be proper) would not disclose every limitation of claim 1.

*D. Conclusion regarding claim 1*

At least in view of the foregoing reasons (non-combinable references, teaching away, and failure to disclose every limitation of the claim) claim 1 patentably distinguishes over Hoffman, Mayes, and Sato. Reconsideration and withdrawal of the rejection of claim 1 under 35 U.S.C. § 103(a) is respectfully requested.

Claims 2-9 and 21 depend from claim 1 and are therefore allowable for at least the same reasons.

**II. Claim 10**

Claim 10 is directed to a rechargeable battery and recites:

the first pole comprises an active material comprising at least one compound represented by a general formula  
MX,

wherein M is an element selected from a group consisting of Cr, Mn, Fe, Co, Ni, Cu, Zn, Pd, Ag, Pt, and Au, and X is an element selected from a group consisting of O and S; and

a conductive material comprising a mixture of fine graphite powder and fine carbon powder, the fine carbon powder having particle diameters of the order of nanometers; the ionic conductor comprises an element belonging to 2A Group and/or 3B Group of a short-form periodic table;

the active material has an average particle diameter as small as 1 nanometer, so that the active material exhibits battery reaction as a result of ions from the ionic conductor interacting with particles in the active material, and wherein constant voltage discharging of the device occurs between 1 and 1.5 volts and the device is rechargeable.

For reasons that should be clear from the above discussion in connection with claim 1, claim 10 also patentably distinguishes over Hoffman, Mayes and Sato. Reconsideration and withdrawal of the rejection of claim 10 under 35 U.S.C. § 103(a) is respectfully requested.

Claims 11-20 and 22 depend from claim 10 and are therefore allowable for at least the same reasons.

General Comments on Dependent Claims

Since each of the dependent claims depends from a base claim that is believed to be in condition for allowance, for the sake of brevity, the Applicant believes that it is unnecessary at this time to argue the further distinguishing features of the dependent claims. However, the Applicant does not necessarily concur with the interpretation of the previously presented dependent claims as set forth in the Office Action, nor does the Applicant concur that the basis for rejection of any of the previously presented dependent claims is proper. Therefore, the Applicant reserves the right to specifically address the further patentability of the dependent claims in the future.

**CONCLUSION**

A Notice of Allowance is respectfully requested. The Examiner is requested to call the undersigned at the telephone number listed below if this communication does not place the case in condition for allowance.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicants hereby request any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, the Director is hereby authorized to charge any deficiency or credit any overpayment in the fees filed, asserted to be filed or which should have been filed herewith to our Deposit Account No. 23/2825, under Docket No. S1459.70129US00.

Dated: 3-15-11

Respectfully submitted,

By Randy J. Pritzker  
Randy J. Pritzker  
Registration No.: 35,986  
WOLF, GREENFIELD & SACKS, P.C.  
600 Atlantic Avenue  
Boston, Massachusetts 02210-2206  
617.646.8000